for the most part dealing with problems in the preparation of catalysts, were turned over for publication to the "Zhurnal fizicheskoy khimii". The papers of several foreign researchers who participated in the conference and those of researchers who could not participate in the conference are included in the collection: A.Bielański, G.Dereń and G. Gaber, W.K.Trzebiatowski, A.Krause (all of Poland), Wu Yüeh and Hsi Hsiao-fang (China). The editors thank Academician A.A. Balandin and G.K. Boreskov and V.V. Voyevodskiy, Corresponding Members of the AS USSR, for valuable suggestions during the compilation of the Collection. There is a bibliography of Soviet and non-Soviet sources at the end of each article.

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S/181/60/002/06/25/050
B006/B056

24.4500

AUTHOR: Kogan, Sh. M.

[redacted]

TITLE: The Green Temperature Quantum Functions

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 6, pp. 1186-1196

TEXT: The good applicability of the Green quantum functions for the treatment of many-body problems has been repeatedly proved. Thus, V. L. Bonch-Bruyevich used them for investigating the energy spectrum of quasi-particles in a many-body system, the problem of plasma vibrations and the screening of an external field in a degenerate electron- or electron-hole gas was solved, and the chemical adsorption on metals was investigated. A. B. Migdal, V. M. Galitskiy, and S. T. Belyayev used this method for investigating the quasi-particle spectrum in non-perfect Fermi and Bose gases. In all these investigations, systems were studied which were in the ground state or in a state very close to the latter. For the purpose of investigating the thermodynamic properties of a quantum system, it is, however, necessary to generalize the method of Green functions, so that it becomes applicable to systems with arbitrary

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The Green Temperature Quantum Functions

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temperatures $T > 0$. This generalization is given in the present paper. It proves to be necessary, above all, for the purpose of investigating a non-degenerate plasma (e.g., in semiconductors), as plasma effects play a very important part in the case of semiconductors already in carrier concentrations that are small compared to those in which Fermi degeneration occurs. For investigating Green temperature functions, a quasi-closed system is studied, which is in statistical equilibrium and for which the temperature T and the chemical potential μ are given; in the concrete case, this is a system of Fermi particles with electromagnetic interaction. The results may easily be transformed for another problem as, e.g., electron-phonon interaction. The spectral theorem (the connection between the poles of the Green function in Fourier representation and the quasi-particle spectrum) is investigated, and in the following, equations of the Schwinger type are derived for the Green temperature functions obtained. The connection between the thermodynamic potential and the Green functions is investigated for a system in which the Hamiltonian $H = H_o + H_{int}$. Finally, it is shown that in all cases in which the interaction constant is sufficiently small,

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X

S/181/60/002/010/035/051
B019/B056

26.2421

AUTHORS: Kogan, Sh. M. and Sandomirskiy, V. B.

TITLE: The Theory of the External Emission of Hot Electrons From Semiconductors

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 10, pp. 2570-2578

TEXT: The authors investigated the emission of hot electrons taking into consideration the carrier interaction with acoustic and optical phonons. The influence of impact ionization upon the investigated effect is also discussed. By using the results obtained by Sandomirskiy in an earlier paper, the authors estimated the emission current of hot electrons at $\chi > \varepsilon_1$. Proceeding from the kinetic equation (1), and by making simplifying assumptions, they arrived at the result that here no noticeable emission current of hot electrons can occur. Furthermore, the emission current in the absence of an electronic collision ($\chi < \varepsilon_1$) is calculated. In the present case, the interaction of electrons with the

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S/076/60/034/009/012/022
B015/B056

AUTHORS: Vol'kenshteyn, F. F. and Kogan, Sh. M.

TITLE: The Concept of the "Quasi-insulated" Surface in the Theory of Chemisorption

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 9, pp. 1996-2004

TEXT: This is a discussion on semiconductors in which the surface states have a denser structure than the interior of the body, which is the case if the semiconductor has a real and not an idealized surface. Besides, the concentration of the electrons and holes which are localized on the surface, may be very high. It is shown in this case the position of the Fermi level F_S on the crystal surface is independent of the position of the Fermi level F_V in the interior of the crystal, which means that also the chemisorption- and catalytical properties of the semiconductor surface are independent of the electronic properties in the interior of the crystal. Surfaces of this kind are described by the authors as

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The Concept of the "Quasi-insulated" Surface in the Theory of Chemisorption

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"quasi-insulated", and occur whenever the absolute value of the difference between the positive and negative charges localized on the surface is small in comparison to their sum. In the case of "quasi-insulated" surfaces, the influence of the crystal impurities upon the chemisorption and catalytic properties vanishes, and only the structure of the surface is significant. Several specific properties of the "quasi-insulated" surface are explained, and three types of surface states are mentioned which lead to a "quasi-insulated" surface. There are 1 figure and 10 references: 9 Soviet and 1 US.

ASSOCIATION: Akademiya nauk SSSR Institut fizicheskoy khimii (Institute of Physical Chemistry of the Academy of Sciences USSR). Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: December 22, 1958

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24889

S/109/61/006/008/009/018
D207/D304

9,4300

AUTHOR: Kogan, Sh.M.

TITLE: Thermal radiation stimulated by hot current carriers in semi-conductors

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 8, 1961, 1354 -1357

TEXT: In the present article the author evaluated the spectral distribution of the radiation intensity of hot current carriers in a homopolar Ge semi-conductor, using the following simplifying assumptions. The length of free path l necessary for dispersing a pulse is determined by the interaction between the carriers and acoustic photons; this assumption does not preclude from the analysis, the case when the length of the path for dispersing energy is greater than 1 and is determined by the interaction with optical photons; the range of radiation frequencies is restricted to that which satisfy in

$$\omega \gg 1/\tau \qquad (1)$$

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Thermal radiation stimulated ... S/109/61/006/008/009/018 D207/D304

where τ is the effective time of free motion of current carriers. For conditions of (1) the dimensions of semi-conductors usually considerably exceed the radiation wavelength so that diffraction may be neglected. It is also assumed that the energy absorption coefficient K is small and consequently the absorption of radiation inside the sample may be neglected, the radiation being then proportional to the volume V. Then the probabilities of emission of one photon with wave vector K and polarization in the direction of unit vector E is given by

$$W^{\text{ab}}_{\substack{\text{поэл} \\ \text{исп} \\ \text{em}}} = \frac{(2\pi)^3}{V^3} \frac{e_1^2}{\epsilon\hbar\omega^3 m^2} \frac{B_1^2\hbar f}{2\rho u} \left\{ \begin{matrix} N_f \\ N_f + 1 \end{matrix} \right\} (\mathbf{f}\mathbf{e}_\lambda)\, \delta\left(\omega_k \mp \Omega_f - \frac{E_p - E_{p\pm f}}{\hbar}\right). \quad (2)$$

In it the suffixes denote the process with photon absorption, and subscripts the process with liberation of a phonon; f and $\hbar\Omega_f$ the wave vector and the photon energy; $\bar{N}_f$ the average number of photons with wave vector f; ρ and ε - the density and dielectric

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constant of the crystal; $\hbar p$ and m = the quasi impulse and the effective electron (or hole) mass.

$$\frac{dI}{d\omega} = V\frac{4\sqrt{2}ne^2\varepsilon^{1/2}}{3\pi m^{3/2}c^3 l}(\hbar\omega)^{3/2}\frac{1}{n}\int\limits_{\sqrt{2m\omega/\hbar}}^{\infty}\frac{2\cdot 4\pi}{(2\pi)^3}dpp^2 n_e(p)\left(\frac{2E_p}{\hbar\omega}-1\right)\left(\frac{E_p}{\hbar\omega}-1\right)^{1/2} \quad (5)$$

is subsequently obtained which determines the spectral distribution of the radiation intensity over a complete solid angle. In it n - the number of carriers per unit volume; c - velocity of light. The electron temperature can be determined in another manner. For the case when the dispersion of the current carriers is determined by the free path independent of energy E_p, T_e is related with mobility inside a strong field μ_F by the simple formula (Ref. 5: Sh.M. Kogan, V.B. Sandomirskiy, Fizika tverdogo tela, 1960, 2, 10, 2570)

$$T_e / T = (\mu_0/\mu_F)^2, \quad (9)$$

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where μ_0 - mobility in weak fields. For the n-Ge at T = 77°K and F = 6 · 10^3 V/cm (m ≅ 0.2 · 10^{-27}g, u ≅ 5 · 10^5 cm/sec, L ≅ 5 · 10^{-5}cm, μ = 2 · 10^4 cm^2/V sec; μ_F = 1.5 · $10^3$$cm^2$/V sec). It follows that in an n-type Ge, temperatures of the order of 10^4°K can be obtained with fields of several kilo volts per centimeter. The intensity of thermal radiation of hot electrons is evaluated for n-type germanium at T_e = 10^4 °K, l = 5 · 10^{-5} cm (T = 77°K), n = 10^9 cm^{-3} assuming that the detector detects the spectrum between ħω = 0.15 eV and ħω = 0.30 eV (Δħω = 0.15 eV) in a solid angle from 1/4 to one. Then ΔI = 4 · 10^{-6} watt, which means that it is possible to detect the thermal radiation of hot electrons experimentally. The interesting property of this radiation is that it is possible to modulate it with very high frequencies, of the order of approximately 10^{10} c/s. The author acknowledges the constructive criticism of V.L. Bonch-Bruyevich, T.M. Lifshits, V.B. Sandomirskiy and O.I.

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Yakovlev. There are 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: J.B. Gunn, Progress in semi conductors, 1957, 2, 211; E.J. Ryder, phys. Rev., 1953, 90, 5, 766.

SUBMITTED: December 21, 1960

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24.7700

38945
S/181/62/004/007/021/037
B102/B104

AUTHOR: Kogan, Sh. M.

TITLE: The theory of photo-conductivity based on the change in carrier mobility

PERIODICAL: Fizika tverdogo tela, v. 4, no. 7, 1962, 1891-1896

TEXT: The photo-conductivity due to changes in carrier mobility is used in sensitive receivers of electromagnetic radiation. A phenomenological theory of such receivers (cf. B. V. Rollin, Proc. Phys. Soc. 77, No. 5, 1102, 1961; T. S. Moss, Lecture at the Photoconductivity Conference in Itaka, USA, 1961) is now developed in greater detail than previously. It is assumed that the symmetrical part of the carrier energy distribution function (with a static field and illumination) is a Fermi function to which a certain electron temperature $T > T_0$ belongs (T_0 - lattice temperature). Following upon any change in the carrier energy the distribution T should be changed. If light is absorbed by the semiconductor, i.e. by its electron gas, the increase in T depends only on the amount of the absorbed power. Under these assumptions it can be shown that the electron

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temperature and the photoconductivity arising from changes in it can be determined by the nonlinearity of the static volt-ampere characteristics. For the photoresponse ΔV an expression is derived, taking into account that any absorption of radiation alters the power from the battery. The electronic heat conductivity has no influence on ΔV.

$$\Delta V = EL_1 \frac{r}{r+R} \frac{\sigma'(\omega, T)}{\sigma(0, T)} \frac{\beta}{1+2\beta E^2 \frac{r}{r+R}} \frac{F^2}{2},$$

where L_1 is the length of the specimen, $\sigma(0,T)$ the static ($\omega = 0$) dark electroconductivity, F the radiation field amplitude. The radiation power absorbed per unit volume is given by $\sigma'(\omega,T)F^2(x)/2$.

$$\beta = \frac{1}{\sigma(0, T)} \frac{d\sigma(0, T)}{dT} \frac{dT}{d(E^2)} = \frac{\frac{d\sigma(0, T)}{dT}}{\frac{dP}{dT} - E^2 \frac{d\sigma}{dT}},$$

where $r/(r+R) \sim 1$, r - ballast resistance, R - sample resistance at given V. If ω is not too high, $\sigma'(\omega,T) \approx \sigma(0,T)$. The growth or attenuation time

The theory of photo-conductivity ... S/181/62/004/007/021/037
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of ΔV is given by

$$\tau = \frac{n\left(\frac{d\varepsilon}{dT}\right)}{\frac{d\varepsilon(0,\,T)}{dT}} \frac{\beta}{1 + 2\alpha E^2 \frac{r}{r+R}}$$

ASSOCIATION: Institut radiotekhniki i elektroniki AN SSSR Moskva (Institute of Radio Engineering and Electronics AS USSR, Moscow)

SUBMITTED: February 28, 1962

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S/056/62/042/004/006/037
B102/B104

AUTHORS: Lifshits, T. M., Kogan, Sh. M., Vystavkin, A. N., Mel'nik, P. G.

TITLE: Some effects induced by r-f irradiation in n-type indium antimonide

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 4, 1962, 959-966

TEXT: Some effects were studied which arise in n-type InSb at 4.2°K when irradiated with r-f electromagnetic waves of the mm-band. The samples were placed in a helium kryostat between the pole-pieces of an electromagnet and were irradiated by $75\cdot10^{9}$ cps modulated with 1000-cps square pulses; the irradiation intensity was $\sim10^{-5}$ w/cm^{-2}. The carrier concentration in the samples at 80°K was $6.5\cdot10^{14}$ cm^{-3}; their mobility was $4\cdot10^{4}$ cm^{2}/v·sec. The volt-ampere characteristics were taken at several transverse magnetic field strengths; in not too weak electrical fields the conductivity increases with the field, a fact which agrees with the assumption that in

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Some effects induced by r-f ...

n-type InSb scattering from ionized impurities is predominant at 4.2°K. In weak fields the characteristics are nonlinear; the authors restrict themselves to positive nonlinearities, characterized by $\beta = [\sigma(E)]^{-1} d\sigma/dE^2$, σ being the conductivity. The emf observed is studied in connection with the following effects: (a) The bolometric effect (heating of the sample by irradiation): no indication. (b) Impurity photoeffect: no indication. (c) Effects at the contacts and the crystal grain boundaries: Effects are unclear; it is improbable that they play a role. (d) Heating of the electron gas by irradiation (change of the energy distribution of the conduction electrons): The emf signal observed in non-zero magnetic field and $v = 0$ (which cannot be attributed to an impurity photoeffect) is due to an electron-temperature gradient and can be considered as a kind of Nernst-Ettingshausen effect. Semiquantitative estimates and theoretical considerations lead to conclusion that, with and without magnetic field, the emf observed is indeed an "electronic" emf, caused by different electron temperatures at the crystallite faces. There are 7 figures.

ASSOCIATION: Institut radiotekhniki i elektroniki Akademii nauk SSSR (Institute of Radio Engineering and Electronics of the Academy of Sciences USSR)

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39673

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B102/B104

AUTHOR: Kogan, Sh. M.

TITLE: Electrodynamics of weakly nonlinear media

PERIODICAL: Zhurnal' eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 1(7), 1962, 304-307

TEXT: If in electrodynamics the nonlinear effects are weak, the current density j(t) can be expanded in a power series of the macroscopic field which can be truncated after the first nonlinear term. The terms of second and third order are now considered.

$$j_i(t)=\int\limits_{-\infty}^{+\infty}\frac{d\omega}{2\pi}e^{-i\omega t}\left\{\sigma_{ij}^{(1)}(\omega)E_j(\omega)+\int\limits_{-\infty}^{+\infty}\frac{d\omega_1}{2\pi}\sigma_{ijk}^{(2)}(\omega,\omega_1)E_j(\omega-\omega_1)E_k(\omega_1)+\right.$$
$$\left.+\int\limits_{-\infty}^{+\infty}\frac{d\omega_1}{2\pi}\int\limits_{-\infty}^{+\infty}\frac{d\omega_2}{2\pi}\sigma_{ijkl}^{(3)}(\omega,\omega_1,\omega_2)E_j(\omega-\omega_1)E_k(\omega_1-\omega_2)E_l(\omega_2)\right\}. \qquad (1)$$

is obtained where $E_j(\omega)$ is the Fourier component of the field, $\sigma_{ij}^{(1)}(\omega)$ the

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tensor of the complex conductivity and where $\sigma^{(2)}_{ijk}(\omega, \omega_1)$ and $\sigma^{(3)}_{ijkl}(\omega, \omega_1, \omega_2)$ are the second- and third-order tensors. General explicit expressions are given for the third-order tensors and their analytic properties are investigated.. The symmetry relations are given by

(7)

$$\sigma^{(3)*}_{ijkl}(\omega, \omega_1, \omega_2) = \sigma^{(3)}_{ijkl}(-\omega, -\omega_1, -\omega_2). \qquad (8).$$

Except that with $\omega \to \infty$ all σ tend towards zero, they have no poles on the real axis. Between the real and the imaginary part the Kramers-Kroning-type dispersion relations

$$\mathrm{Re}\,\sigma^{(2)}_{ijk}(\omega, \omega_1) = \frac{1}{\pi} \mathrm{P} \int_{-\infty}^{+\infty} \frac{d\omega'}{\omega' - \omega} \mathrm{Im}\,\sigma^{(2)}_{ijk}(\omega', \omega_1),$$
$$\mathrm{Im}\,\sigma^{(2)}_{ijk}(\omega, \omega_1) = -\frac{1}{\pi} \mathrm{P} \int_{-\infty}^{+\infty} \frac{d\omega'}{\omega' - \omega} \mathrm{Re}\,\sigma^{(2)}_{ijk}(\omega', \omega_1) \qquad (9)$$

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40886

S/181/62/004/009/021/045
B104/B186

24.7700

AUTHOR: Kogan, Sh. M.

TITLE: Theory of hot electrons in semiconductors

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2474-2484

TEXT: A system of hot electrons that interacts weakly with lattice vibrations is investigated. The power transferred to the lattice by these electrons is given by

$$P = \frac{1}{\hbar^2}\int \frac{d^3f}{(2\pi)^3}\hbar\omega_f |c_f|^2 [N_f(T) - N_f(T_0)] K(f, \omega_f), \quad (10)$$

$$K(f, \omega) = \int d^3r \int_{-\infty}^{+\infty} dt \exp(-ifr + i\omega t) \langle [\rho(r, t), \rho(0, 0)] \rangle, \quad (11)$$

where $N_{\vec{f}}$ is the number of particles, $\vec{f}$ the wave vector, and ρ the density operator. When the electron gas is strongly degenerate and if energy is

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Theory of hot electrons in ...

dissipated at the deformation potential, then P(T) is given by

$$P=\frac{\varepsilon_c^2 m^3 D_4}{4\pi^3\hbar^7 s^4\rho}(T^5-T_0^5) \quad (23),$$

and if energy is dissipated at the piezoelectric potential, then

$$P=\frac{8e^2e_{14}^2m^2D_2\overline{s^{-2}}}{\pi\hbar^5\varkappa^2\rho}(T^3-T_0^3),$$

$$D_n=\int\limits_0^\infty dx\,x^n(\exp x-1)^{-1}, \quad (24),$$

$$\overline{s^{-2}}=\sum_\alpha\int\frac{d\Omega}{2\pi}(e_1e_2v_3+e_1e_3v_1+e_3e_1v_2)^2 s_\alpha^{-2}(\Theta,\Phi)$$

where e_{14} is the piezoelectric modulus of the crystal; $\vec{e} = \vec{f}/f$; $\vec{v}$ is the

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unit vector of wave polarization; κ is the dielectric constant, and $s(\theta,\phi)$ is the wave velocity which depends on the type of wave and on the direction of propagation. For a non-degenerate electron gas in a strongly quantizing magnetic field, P(T) is obtained as.

$$P(T)=n(T-T_0)T^{-1/2}\left[\frac{m^{5/2}\varepsilon_c^2(\hbar\omega_H)^2}{(2\pi)^{3/2}\hbar^4\rho}\right]\ln(\gamma^{-1}e^{-C}-1); \quad (40)$$

if energy is dissipated at the deformation potential, and as

$$P(T)=n(T-T_0)T^{-3/2}\frac{8(2\pi)^{1/2}m^{3/2}e^2e_{14}^2\hbar\omega_H}{\hbar^3\kappa^2\rho}\ln\gamma^{-1}e^{-C} \quad (42)$$

if energy is dissipated at the piezoelectric potential. Here, n is the electron concentration, ε_c is the constant of the deformation potential, ω_H is the cyclotron frequency, C is Euler's constant, and

$\gamma = ms^2\hbar\omega_H/8T^2$. The expressions obtained for P(T) are used to analyze the volt-ampere characteristic of a semiconductor in strong electric fields. It is noted that in a number of cases the time of energy dissipation and the mean square deviation from Ohm's law are abnormal, i. e., they increase with temperature. In the case of piezoelectric energy dissipation on charged impurities, the volt-ampere characteristic may have S-shape. The effect of negative conductivity, observed by R. F. Kazarinov and V. G. Skobov (ZhETF, 42, no. 4, 1047, 1962) for transversely arranged magnetic and electric fields, is valid also for longitudinal fields, moreover not only in reference to the deformation potential but also in reference to the piezoelectric potential of acoustic phenomena.

ASSOCIATION: Institut radiotekhniki i elektroniki AN SSSR, Moskva (Institute of Radio Engineering and Electronics AS USSR, Moscow)

SUBMITTED: April 26, 1962

44508

S/181/63/005/001/034/064
B102/B186

AUTHOR: Kogan, Sh. M.

TITLE: Electron temperature fluctuations and the noise produced by them

PERIODICAL: Fizika tverdogo tela, v. 5, no. 1, 1963, 224 - 228

TEXT: Owing to the random electron-phonon collisions in a lattice the electron temperature will fluctuate about a mean value T. If no field is applied to the lattice, T will equal the lattice temperature T_0; if there is a field, $T > T_0$. If the conductivity σ depends on the electron temperature, the fluctuations of the latter will cause fluctuations of the voltage drop

$$\Delta V = -V_R\left[\frac{r}{r+R}\right]\frac{\Delta\sigma}{\sigma} = -V_R\left[\frac{r}{r+R}\frac{d\sigma}{dT}\frac{1}{\sigma}\right]\Delta T, \quad (1)$$

and therefore a noise. The spectral density of this noise is calculated for the usual noise-recording circuit: a sample with resistance R is connected in series with a ballistic resistance r and the current source; R may be a function of the field E in the sample. If V_R is the voltage applied to the sample,

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(7a)

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If the electron gas is nondegenerate, $\frac{T_o}{\sigma}\left|\frac{d\sigma}{dT}\right| \sim 1$, if it is strongly degenerate, $\frac{T_o}{\sigma}\left|\frac{d\sigma}{dT}\right| \ll 1$; $E_p = \left[\beta(0)\right]^{-1/2}$ is that field in which the mobility changes by one order of magnitude. Therefore the noise due to electron-temperature variations becomes comparable with the Johnson noise only in strong fields of the order of E_p. In strong fields, where $T > T_o$,

$$G_T(\nu) = \left(\frac{4D\tau^2}{\nu n^2 c_e^2}\right)(1+\omega^2\tau^2)^{-1}, \qquad (19)$$

where

$$N_f(T) = \left[\exp\left(\frac{\hbar\omega_f}{T}\right) - 1\right]^{-1},$$

$$K(\mathbf{f}, \omega) = \int d^3r \int_{-\infty}^{+\infty} dt \exp(i\omega t - i\mathbf{f}\mathbf{r}) \langle\langle \rho(\mathbf{r}, t), \rho(0, 0)\rangle\rangle; \qquad (16)$$

$$D = \frac{1}{2\hbar^2 (2\pi)^3} \int d^3f (\hbar\omega_f)^2 \left[\exp\frac{\hbar\omega_f}{T} + \exp\frac{\hbar\omega_f}{T_e}\right] \times$$
$$\times N_f(T_e) N_f(T) |c_f|^2 K(\mathbf{f}, \omega_f). \qquad (18);$$

$\vec{f}$ and $\omega_{\vec{f}}$ are wave vector and frequency of the phonon, $c_{\vec{f}}$, the matrix element of electron-phonon interac-

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LIFSHITS, T.M.; KOGAN, Sh.M.; VYSTAVKIN, A.N.; MEL'NIK, P.G.

Some phenomena induced in n-type indium antimonide by radio-frequency radiation. Zhur.eksp.i teor.fiz. 42 no.4:959-966 Ap '62. (MIRA 15:11)

1. Institut radiotekhniki i elektroniki AN SSSR.
(Radio waves) (Indium-antimony alloys)

KOGAN, Sh.M.

Electrodynamics of weakly nonlinear media. Zhur. eksp. i teor. fiz. 43 no.1:304-307 Jl '62. (MIRA 15:9)

1. Institut radiotekhniki i elektroniki AN SSSR.
(Electric conductivity) (Calculus of tensors)

KOGAN, Sh.M.

Theory of photoconductivity based on changes in the mobility of current carriers. Fiz.tver.tela 4 no.7:1891-1896 Jl '62. (MIRA 16:6)

1. Institut radiotekhniki i elektroniki AN SSSR, Moskva. (Photoconductivity)

KOGAN, Sh.M.

Theory of hot electrons in semiconductors. Fiz. tver. tela 4 no.9:2474-2484 S '62. (MIRA 15:9)

1. Institut radiotekhniki i elektroniki AN SSSR, Moskva. (Electrons) (Semiconductors)

KOGAN, Sh. M.

Electron temperature fluctuations and the resultant noise. Fiz. tver. tela 5 no.1:224-228 Ja '63. (MIRA 16:1)

1. Institut radiotekhniki i elektroniki AN SSSR, Moskva.

(Electrons) (Crystal lattices)

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APPROVED FOR RELEASE: 09/18/2001 CIA-RDP86-00513R000723620001-0"

L 10369-63 EWT(1)/BDS/EEC(b)-2--AFFTC/ASD/ESD-3--Pi-4--IJP(C)

ACCESSION NR: AP3000997 S/0109/63/008/006/0994/1001

AUTHOR: Vystavkin, A. N.; Kogan, Sh. M.; Lifshits, T. M.; Mel'n'k, P. G. 64

TITLE: Electronic thermomagnetic effect

SOURCE: Radiotekhnika i elektronika, v. 8, no. 6, 1963, 994-1001

TOPIC TAGS: Electronic thermomagnetic effect, InSb single crystal specimen, electron concentrations, magnetic field, liquid helium temperature, cavity resonator, sensitivity, radiated power

ABSTRACT: The electronic thermomagnetic effect in InSb n-type single crystal specimens has been investigated. Specimens (5 x 5 x 0.8 mm) with an electron concentration of 10 sup 14 cm sup -3 and a mobility of ... x 10 sup 4 to ... sup 4 cm sup 2/v x sec at T sub 0 = 4.2K (without magnetic field) were ... into a cavity cooled by liquid helium. ... generator provided a signal ... and was modulated by a 1 kc square wave. The appearance of an emf ... specimen terminals caused by the applied signal was observed only ... presence of a permanent magnetic field. With ... increase of the ... of the magnetic field the emf also increased and at H approximately

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L 10369-63
ACCESSION NR: AP3000997

equal to 1700 oe, reached its maximum and then dropped again. It follows from the amplitude characteristics obtained that the photoresponse of the electron- ... magnetic effect remains linear up to the signal ... sup -4 w. ... was determined to be 500 v w ... for specimens ... carrier concentration ... 14 cm sup -3. The noise level of samples ... the limits of ... accuracy (plus or minus 50% was found ... the thermal resistance noise of the specimens. ... radiated power with a signal-to-noise ratio ... w. The inertia of the electron ... the transfer time ... less than or equal to ... sup ... was noted that the ... effect depends very little on the frequency ... therefore be ... during bombardment of the specimen by radiation over a broad spectrum. Orig. art. has: 4 figures and 23 formulas.

ASSOCIATION: none

SUBMITTED: 12Feb63 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 004 OTHER: 001

Card 2/2 ch/

SANDOMIRSKIY, V.B.; KOGAN, Sh.M.

Electroacoustic effects in piezoelectric semiconductors. Fiz. tver. tela 5 no.7:1894-1899 Jl '63. (MIRA 16:9)

1. Institut radiotekhniki i elektroniki AN SSSR, Moskva.
(Electroacoustics) (Piezoelectricity)

KOGAN, Sh.M.

Piezoelectric effect in nonuniform deformation and acoustic scattering of current carriers in crystals. Fiz. tver. tela 5 no.10:2829-2831 O '63. (MIRA 16:11)

1. Institut radiotekhniki i elektroniki AN SSSR, Moskva.

KOGAN, Sh. M.; LIFSHITS, T. M.; SIDOROV, V. I.

"Photoconductivity in germanium due to the optical transitions between the impurity centers."

report submitted for Intl Conf on Physics of Semiconductors, Paris, 19-24 Jul 64.

Inst of Radio Engineering & Electronics, AS USSR

ACCESSION NR: AP4012570 S/0056/64/046/001/0395/0396

AUTHORS: Kogan, Sh. M.; Lifshits, T. M.; Sidorov, V. I.

TITLE: Optical transitions between near impurity centers and the associated photoconductivity

SOURCE: Zhurnal eksper. i teoret. fiz., v. 46, no. 1, 1964, 395-396

TOPIC TAGS: optical transition, tunnel effect, photoconductivity, carrier tunnel transition, semiconductor, highly doped semiconductor, germanium, zinc impurity, antimony compensation impurity

ABSTRACT: Optical tunnel transitions of carriers between nearby impurity centers of different type occurring in a semiconductor at sufficiently high impurity concentration, and the resultant characteristic photoconductivity, are investigated. This effect can also be observed when the necessary two levels are due to a single impurity with several charge states. Germanium doped with zinc and

Card 1/32

ACCESSION NR: AP4012570

compensated with antimony was used at liquid-helium temperature. The observed peak is attributed to an optical transition of a hole from a Zn^- ion to a nearby similar ion. A second hole of the resultant Zn^0 neutral atom wanders along the Zn^- ions and contributes to the jump in conduction. Arguments are advanced in favor of this interpretation. "The authors are grateful to S. G. Kalashnikov for valuable discussions." Orig. art. has: 1 figure.

ASSOCIATION: Institut radiotekhniki i elektroniki AN SSSR (Institute of Radio Engineering and Electronics, AN SSSR)

SUBMITTED: 06Nov63 DATE ACQ: 26Feb64 ENCL: 01

SUB CODE: PH NO REF SOV: 002 OTHER: 001

Card 2/2

ACCESSION NR: AP4038624 S/0109/64/009/004/0724/0727

AUTHOR: Kogan, Sh. M.; Sandomirskiy, V. B.

TITLE: Effect of a quantising magnetic field on the field emission

SOURCE: Radiotekhnika i elektronika, v. 9, no. 4, 1964, 724-727

TOPIC TAGS: electron emission, field emission, magnetically quantized field emission

ABSTRACT: The superimposition of a quantizing magnetic field controls the energy spectrum of electrons in a solid-state body and, therefore, may control the field-emission current. The field-emission-current density is found to be equal: $j_z = \frac{4\pi^4 q\hbar^4}{m^3\chi}\left(\frac{2\chi}{m}\right)^{1/2}\frac{n^3}{\omega^3}e^{-F_0/F}$, and the total-energy distribution of emitted electrons is given by:

Card 1/2

DEVYATKOV, A.G.; KOGAN, Sh.M.; LIFSHITS, T.M.; OLEYNIKOV, A.Ya.

Electroconductivity of n-type indium antimonide at low temperatures. Fiz. tver. tela 6 no.6:1657-1663 Je '64. (MIRA 17:9)

1. Institut radiotekhniki i elektroniki AN SSSR, Moskva.

APPROVED FOR RELEASE: 09/18/2001 CIA-RDP86-00513R000723620001-0"

APPROVED FOR RELEASE: 09/18/2001 CIA-RDP86-00513R000723620001-0"

It is shown in particular that the conclusion drawn by B. K. Ridley (Proc. Phys. Soc. v. 82, 954, 1963), namely that such a system is ... unstable and breaks up into domains of weak and strong field,

EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h)

ACC NR: AP5028015 SOURCE CODE: UR/0386/65/002/008/0365/0368

AUTHOR: Kogan, Sh. M.; Lifshits, T. M.; Sidorov, V. I.

ORG: Institute of Radio Engineering and Electronics, Academy of Sciences, SSSR (Institut radiotekhniki i elektroniki Akademii nauk SSSR)

TITLE: Recombination radiation stimulated in silicon by long wavelength infrared radiation

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu (Prilozheniye), v. 2, no. 8, 1965, 365-368

TOPIC TAGS: recombination radiation, silicon, IR photoconductor, photosensitivity, spectral distribution

ABSTRACT: The purpose of the investigation was to check the conditions under which charge exchange increases the photoresponse of a semiconductor in the region of impurity absorption of light and causes the appearance of recombination radiation stimulated by light from the impurity-absorption region. The existence of such a mechanism was experimentally confirmed, using silicon doped with boron and antimony (N_B = 8×10^{13} cm^{-3}, N_{Sb} = 2×10^{14} cm^{-3}). A silicon sample measuring 2 x 2 x 6 mm was mounted in a standard helium cryostat, in which the sample could be cooled to 7--9K. The sample was illuminated through a cold window (filter) of indium antimonide with modulated monochromatic radiation in the wavelength range from 8 to 20 μ. The sample could be simultaneously exposed to unmodulated light from a small incandescent lamp placed in ... the sample, a commercial germanium photodiode with a

Card 1/3 0901 1750

L 6480-66

ACC NR: AP5028015

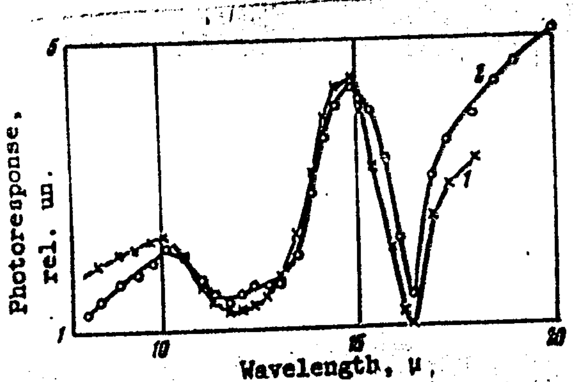

Fig. 1. Spectral distribution of the photocurrent in a silicon sample (2) and in a germanium photodiode (1), relative to the monochromatic power incident in the InSb cold filter

glass entrance window was mounted in the cryostat so that it could register the possible radiation from the sample. The photoresponses of the sample and of the photodiode were registered with a standard measuring circuit, including an amplifier, a synchronous detector, and an automatic recorder. The photodiode did not respond to the modulated IR radiation unless the additional lamp was also on, or, conversely, to the additional lamp alone without the IR radiation. On the other hand, when the sample was simultaneously illuminated by the lamp and by the modulated IR radiation from

L 6480-66
ACC NR: AP5028015

the monochromator, a photoresponse signal at the frequency of the IR-radiation modulation was produced by the germanium photodiode (Fig. 1). The figure shows the spectral distribution of the photoresponse of the germanium photodiode (Curve 1) as well as the spectral curve of the photocurrent from the silicon sample (Curve 2). The photodiode signal and the photoresponse of the sample depend on the intensity of the unmodulated illumination. The photocurrent induced in the sample by the illumination could increase by a factor of more than 100, but without a change in the spectral distribution of the photoconductivity. The agreement between the spectral distribution of the silicon sample and the germanium photodiode, together with the fact that the photoresponse of the diode is produced only by simultaneous exposure of the silicon sample to the monochromatic radiation and the additional illumination, shows decisively that recombination radiation stimulated by long wavelength IR light occurs in charge-exchanged silicon. It is thus proved that the long wavelength radiation was transformed in the experiment into short wavelength radiation with an appreciable gain (by a factor ... in photon energy. Authors thank ... for supplying the test material. Orig. art. has: 1 figure. [02]

SUB CODE: OP/ SUBM DATE: 07Aug65/ ORIG REF: 002/ ATD PRESS: 4140

nw
Card 3/3

L 40168-66 EWT(1)/T IJP(c) GG

ACC NR: AP6018806 SOURCE CODE: UR/0056/66/050/005/1279/1284 57 B

AUTHOR: Kogan, Sh. M.; Suris, R. A.

ORG: Institute of Radio Technology and Electronics, AN SSSR (Institut radiotekhniki i elektroniki AN SSSR)

TITLE: Resonance interaction between impurity-center electrons and lattice oscillations

SOURCE: Zh eksper i teor fiz, v. 50, no. 5, 1966, 1279-1284

TOPIC TAGS: impurity center, resonance interaction, phonon, absorption spectrum, ELECTRON

ABSTRACT: It has been shown that the interaction between the electron of an impurity center and optical oscillations in semiconductors may lead to the appearance of local optical oscillations. To separate the optical frequency, the transition energy of the electron from the ground state to an excited one must be close to the phonon energy. Optical absorption by an impurity center has been investigated for such

21 21

Card 1/2

L 40162-66

ACC NR: AP6018806

a resonance interaction. It has been shown that the appearance of local optical oscillation corresponds to the appearance of an additional line in the optical absorption spectrum. Orig. art. has: 2 figures and 33 formulas. [Based on authors' abstract] [NT]

SUB CODE: 20/ SUBM DATE: 22Oct65/ ORIG REF: 002/ OTH REF: 001/

Card 2/2 MLP

ACC NR: AP6026688 SOURCE CODE: UR/0181/66/008/008/2382/2389

AUTHOR: Kogan, Sh. M.; Sedunov, B. I.

ORG: Institute of Radio Engineering and Electronics, AN SSSR, Moscow (Institut radiotekhniki i elektroniki AN SSSR)

TITLE: Photothermal ionization of an impurity center in a crystal

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2382-2389

TOPIC TAGS: impurity center, thermal ionization, electron energy level, phonon interaction, photon, photoionization

ABSTRACT: Experiments were made on germanium with group III and V impurities. An expression is obtained for the photothermal ionization cross section of an impurity center, i. e., its ionization by photons of energy less than the ionization energy. When an electron interacts weakly with lattice vibrations and the photon energy is close to the electron excitation energy, noncoherent processes contribute the most to the cross section. In these processes, the electron first absorbs a photon, rises to an excited level, and assumes a noncoupled state by absorbing phonons. Comparison of the experimental photoionization peaks and the optical absorption in the excitation peaks makes it possible to estimate the probability of the thermal ionization of the excitation levels. Results are compared with those of other investigators. The authors thank T.

ACC NR: AP6026688

M. Lifshits, F. Ya. Nad', and V. I. Sidorov for communicating experimental results prior to publication, and to L. V. Keldysh, V. B. Sandomirskiy, and R. A. Suris for discussions. Orig. art. has: 26 formulas.

SUB CODE: 20/ SUBM DATE: 10Jan66/ ORIG REF: 006/ OTH REF: 005

Card 2/2

BARS, Ye.A.; KOGAN, S.S.; MIKHEYEVA, N.I.

Ratio of the volatile and nonvolatile organic substances in the reservoir waters of oil fields. Neftegaz. geol. i geofiz. no.10: 49-51 '64 (MIRA 18:1)

1. Institut geologii i razrabotki goryuchikh iskopayemykh AN SSSR.

ACCESSION NR: AP4039650 S/0181/64/006/006/1657/1663

AUTHOR: Davyatkov, A. G.; Kogan, Sh. M.; Lifshits, T. M.; Oleynikov, A. Ya.

TITLE: Conductivity of n-type indium antimonide at low temperatures

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1657-1663

TOPIC TAGS: n type indium antimonide, volt ampere characteristic nonlinearity, field dependent conductivity, temperature dependent conductivity, nonlinear temperature dependence

ABSTRACT: The nonlinearity of n-type InSb volt-ampere characteristics at low temperatures and its dependence on field, temperature, and concentration are discussed. Measurements were made at about 1.5—15K on specimens with dimensions of 10 x 1.5 x 1 mm and electron concentrations of 1.8×10^{13} to 1.5×10^{15} cm^{-3} in a field range of 0.02 to 0.3 v/cm. The results of the investigation have shown that: 1) conductivity σ increases with temperature, while nonlinearity

ACCESSION NR: AP4039650

considerably decreases both with an increase in carrier concentration and with an increase in specimen temperature; 2) in all cases, the dependence of σ on lattice temperature T_0 is markedly weaker than $T^{3/2}$; 3) at low temperatures specimens with high electron concentrations showed a saturation of $\sigma(T_0)$, which is apparently caused by the degeneration of the electron gas; 4) at a donor concentration of 10^{14} cm^{-3} and a carrier concentration of 1×10^{14} cm^{-3}, the coefficient of nonlinearity $\beta(E)$, where E is the field intensity, first increases as the field increases, reaches a maximum, and then decreases. In the region of the low fields, β increases with an increase in lattice temperature, and decreases in the region of the maximum and of higher fields, so that at high T_0, function $\beta(E)$ declines monotonically with the field. The authors explain the field and temperature dependences of σ and β by the fact that electron pulse dispersion occurs on the charged impurity, while energy dispersion occurs on the deformed and piezoelectric potential of acoustic phonons. Orig. art. has: 6 figures and 7 formulas.

Card 2/3

ACCESSION NR: AP4039650

ASSOCIATION: Institut radiotekhniki i elektroniki AN SSSR, Moscow (Institute of Radio Engineering and Electronics, AN SSSR)

SUBMITTED: 16Dec63 DATE ACQ: 19Jun64 ENCL: 00

SUB CODE: EM, PH NO REF SOV: 003 OTHER: 004

Card 3/3

KOGAN, S.S

ALEKSEYEV, F.A.; BARS, Ye.A.; GULYAYEVA, L.A.; GLEZER, V.G.; GAVRILENKO, Ye.S., KOGAN, S.S.

Erroneous interpretation of V.A. Sulin's genetic classification of waters. Geol. nefti 1 no.6:66-69 Je '57. (MIRA 10:8)
(Water, Underground--Analysis)

PATRASOV, V.I.; KOGAN, S.S., red.

[Safety measures in the manufacture of alkyd lacquers, natural drying oils and siccatives] Tekhnika bezopasnosti v proizvodstve alkidnykh lakov, natural'nykh olif i sikkativov. Moskva, Izd-vo "Khimiia," 1964. 21 p. (MIRA 17:6)

KOGAN, S. S.

Teoriia i Raschet Filtrov dlia Ustanovok Dalnei Sviazi (Theory and Calculation of Filter Settings for Telephone Reception), 177 p., Moscow, 1950.

KOGAN, S. S., Cand Tech Sci

"The Theory and Calculation of Filters for Long-Distance Communications Equipment." Dr Tech Sci, Moscow Electrical Engineering Inst of Communications, 25 Nov 54. (VM, 14 Nov 54)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (11)

SO: Sum, No. 521, 2 Jun 55

stages. S. S. Kogan. *Radiotekhnika*, 10, No. 2 ... In Russian.

... quartz crystals with partitioned electrodes. The electrical equivalent is the parallel combination of L ... C ... in series and separate C ... where ...

KOGAN, S.S.

[illegible]

[illegible] АТС [illegible]

[illegible]

[illegible] АТС.

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(с 18 до 22 часов)

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С. С. Коган

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21

report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORiE), Moscow, 8-12 June. 1959

28003
S/194/61/000/004/050/052
D201/D302

9.2550

AUTHOR: Kogan, S.S.

TITLE: Magneto-striction filters for long-range multi-channel communication systems

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 4, 1961, 3, abstract 4 L13 (V sb. 100 lyet sodnya rozhd. A.S. Popova, AN SSSR, 1960, 144-159)

TEXT: New magneto-strictive ferrocarts are considered which may be used as magneto-striction resonators in filter design. The Q-factor of magneto-striction resonators is 4000-6000. This makes it possible to design channel filters for long-range communication systems, having better characteristics and costing less compared with crystal filters. The analysis of magneto-striction filter circuits is given, their own parameters taken as the basis for the analysis together with the design method of filters from the given operating parameters. 1 reference. [Abstracter's note: Complete translation] 4

Card 1/1

KOGAN, S.S.

Operational parameters of highly selective filters. Elektrosviaz' 17 no.12:1-13 D '63. (MIRA 17:2)

BARS, Yelena Antonovna; KOGAN, Sof'ya Solomonovna

[Organic matter in the underground waters of oil-bearing provinces; methods of analysis and interpretation] Organicheskoe veshchestvo podzemnykh vod neftegazonosnykh oblastei; metodiki analiza i interpretatsii. Moskva, Nedra, 1965. 90 p. (MIRA 18:5)

KOGAN, S.S.

Phase equalization of electric filters. Elektrosvyaz', 19 no.3:53-64 Mr '65.
(MIRA 18:5)

BARS, Ye.A.; KOGAN, S.S.; SELEZNEVA, L.I.

Some results of the qualitative determination of organic substance dissolved in underground water. Neftegaz. geol. i geofiz. no.4:38-40 '65. (MIRA 18:7)

1. Institut geologii i razrabotki goryuchikh iskopayemykh, Moskva.

KOGAN, S. YA.

60-37-7/7

AUTHOR: Kogan, S. Ya.

TITLE: A Method for Computing the Advective Influx of Heat (O metode rascheta advektivnogo pritoka tepla)

PERIODICAL: Trudy Geofizicheskogo instituta Akademii nauk SSSR, 1956, Nr 37(164), pp. 132-141 (USSR)

ABSTRACT: The author proposes a method for computing the advective influx of heat, based on the assumption that at a given point within a small area the distribution of temperature is represented by a surface of the second order. The suggested technique makes it possible to reduce the computations to a set of simple standard schemes. Two concrete examples of such calculations are given. There are 2 figures, 2 schemes, 2 tables, and 3 references, all USSR.

AVAILABLE: Library of Congress

Card 1/1

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1241
AUTHOR KOGAN, S.YA.
TITLE On the Method of Spherical Harmonics in Atmospheric Optics.
PERIODICAL Dokl. Akad. Nauk, 108, 1053-1055 (1956)
Publ. 6 / 1956 reviewed 9 /1956

The present work describes a possibility for the removal of arbitrariness in satisfying boundary conditions when solving the kinetic equations of BOLTZMANN, and for the ascertaining of the rigorous solution by spherical harmonics. For purposes of simplicity the isotropic scattering of light in the atmosphere is studied. The corresponding transport equation of the radiation energy and the boundary conditions belonging to it are given. The albedo of the surface of the earth is assumed to be equal to zero, and from the surface of the upper boundary of the stratosphere no radiation is assumed to be scattered to the atmosphere. The solution of this transport equation is set up as a development in series according to spherical harmonics. In view of the fact that in the case investigated scattering is isotropic, LEGENDRE'S polynomials are inserted into the transport equation, and the infinite system of equations for the coefficients of the series is given. The solution of the shortened system of equations for the coefficients of development is then an approximated solution of the transport equation. If the index of the system moves from zero to N, the system of equations for the coefficients of development comprises N + 1 differential equations of the first order.
The solution of this system is here denoted by the vector $J(\tau)$ with the com-

ponents $I_0(\tau), I_1(\tau), \ldots I_N(\tau)$ and contains N+1 arbitrary constants, which may be determined from the boundary conditions. These boundary conditions and the coefficients of development occurring therein are explicitly given.
According to the author's opinion, and in contradiction to what has been said by S.CHANDRASEKHAR Ap.J.99, No 180 (1944) and other authors, there follow from these boundary conditions exactly N+1 equations for the determination of the N+1 arbitrary constants. When using the method of spherical harmonics, the number N is best employed as an odd number, in which case the characteristic equation of the matrix of the system of equations contains only even powers of the unknown and therefore has $(N+1)/2$ positive and the same number of negative solutions. If n is finite the characteristic values of the matrix are not all equal to 1/2 or -1/2, but with $N \to 0$ all roots tend towards 1/2 or -1/2.
In conclusion the system of equation consisting of N+1 equations is given for the determination of the N + 1 arbitrary constants. By inserting these constants into the expressions for the coefficients of development in the series according to LEGENDRE polynomials, the solution of the aforementioned transport equation is obtained. Finally, a method of improving this solution is described.

INSTITUTION:

KOGAN, S.Ya.

3(7) PHASE I BOOK EXPLOITATION SOV/1685

Akademiya nauk SSSR. Komitet po geodezii i geofizike.

Tezisy dokladov na XI General'noy assambleye Mezhdunarodnogo geodezicheskogo i geofizicheskogo soyuza. Mezhdunarodnaya assotsiatsiya meterologii (Abstracts of Reports at the 11th General Assembly of the International Union of Geodesy and Geophysics. The International Association of Meteorology) Moscow, 1957. 38 p. /Parallel texts in Russian and English or French/ 1,500 copies printed. No additional contributors mentioned.

PURPOSE: This booklet is intended for meteorologists.

COVERAGE: These reports cover various subjects in the field of meteorology. Among the specific subdivisions discussed are: the heat balance of the Earth's surface, jet streams, transference of heat radiation, electric coagulation of cloud particles, turbulent diffusion, cloud studies, and others. Abstracts of all the articles are translated into either French or English. There are no references given.

TABLE OF CONTENTS:

Card 1/3

Abstracts of Reports (Cont.) SOV/1685

Khrgiyan, A. Kh. Cloud Study 36

AVAILABLE: Library of Congress (QC 852.A35)

Card 3/3

MM/gmp
5-18-59

KOGAN, S. Ya., MALKEVICH, M. S., and FEYGELSON, Ye. M.

"The Approximate Methods of Evaluating the Light Intensity for the Case of Non-Spherical Scattering in the Earth's Atmosphere and the Results of Calculations,"

paper presented (by S. Ya. Kogan) at the 11th General Assembly of Intl. Union of Geodesy and Geophysics, Toronto, Canada, Sept 1957.

Eval. B-3,099,096.

AUTHOR: Kogan, S. Ya.

49-3-10/16

TITLE: Method of spherical functions applied to the problem of scattering of light in the atmosphere. (Primeneniye metoda sfericheskikh funktsiy k zadache o rasseyanii sveta v atmosfere).

PERIODICAL: "Izvestiya Akademii Nauk, Seriya Geofizicheskaya" (Bulletin of the Ac.Sc., Geophysics Series), 1957, No.3, pp.384-394 (U.S.S.R.)

ABSTRACT: The problem of radiation scattering in a plane-parallel atmosphere with non-spherical scattering curve is formulated, and the method of spherical functions is used for its solution. The here applied method of spherical functions has the advantage of utilising the invariance of the scattering relative to a turning of the coordinate system. The problem of fulfilling the boundary conditions is discussed. Formulae with a greater degree of exactness are derived for determining the intensity of scattered radiation, when the albedo of the Earth's surface is taken into account. Examples are given of calculating the intensity of scattered radiation by means of the method of spherical functions, in the cases of spherical and non-spherical scattering curves (Rocard curve). The method of spherical functions

Card 1/2

49-3-10/16

Method of spherical functions applied to the problem of scattering of light in the atmosphere. (Cont.)

can be applied for solving the problem of scattering of light even in cases in which the scattering indicatrix changes with the height.
There are 4 figures, 2 tables and 11 references, 7 of which are Slavic.

SUBMITTED: July 7, 1956.

ASSOCIATION: Ac.Sc. U.S.S.R., Institute of Physics of the Atmosphere. (Akademiya Nauk SSSR Institut Fiziki Atmosfery)

Card 2/2

KOGAN, S.Ya.

3(7) PHASE I BOOK EXPLOITATION SOV/1837

Akademiya nauk SSSR. Institut fiziki atmosfery

Raboty po dinamicheskoy meteorologii (Works on Dynamic Meteorology) Moscow, Izd-vo AN SSSR, 1958. 186 p. (Series: Its: Trudy, vyp. 2) 1,500 copies printed.

Resp. Ed.: I.A. Kibel', Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: K.P. Gurov.

PURPOSE: The issue of the Institutes' Trudy [Transactions] is intended for scientists and research workers engaged in weather forecasting and climatology.

COVERAGE: This collection of articles represents the results of 12 studies in dynamic meteorology, carried out from 1951 through 1954. They treat weather forecasting techniques using the methods of dynamic meteorology as well as general theoretical questions in the study of climate. All authors, except N.I. Buleyev and A.D. Christyakov, are associated with the Geofizicheskiy institut (Geophysical Institute of the Academy of Sciences). A.D. Christyakov and N.I. Buleyev are associated with the Tsentral'nyy institut prognozov (Central Institute of Forecasts), GUGMS. References accompany each article.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

MM/jmr
6-15-59

Card 4/4

KOGAN, S. Ya.

24(4) PHASE I BOOK EXPLOITATION SOV/2545

Feygel'son Ye. M., M. S. Malkevich, S. Ya. Kogan, T. D. Koronatova, K. S. Glazova, and M. A. Kuznetsova

Raschet yarkosti sveta v atmosfera pri anizotropnom rasseyanii, ch. 1 (Computation of Light Intensity in the Atmosphere in a Case of Anisotropic Scattering, Pt. 1) Moscow, Izd-vo AN SSSR, 1958. 101 p. (Series: Akademiya nauk SSSR. Institut fiziki atmosfery. Trudy, nr 1) Errata slip inserted. 2,000 copies printed.

Ed.: G. V. Rozenberg, Doctor of Physical and Mathematical Sciences; Ed. of Publishing House: V. I. Rydnik.

PURPOSE: This book is intended for physicists and scientists engaged in the study of atmospheric optics.

COVERAGE: This work contains the results of computation on the intensity of light scattered anisotropically in the atmosphere under various physical parameters and functions of scattering. The solution of integro-differential equations of the theory of radiative transfer in an anisotropically scattering medium

Card 1/4

was obtained by the method of successive approximations. The work was carried out by the staff members of the Laboratory of Atmospheric Optics within the Institute of Physics of the Atmosphere, Academy of Sciences, USSR. No personalities are mentioned. There are 23 references: 14 Soviet, 4 English, 4 German, and 1 French.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

Card 4/4

MM/jb
11-2-59

49-58-5-12/15

AUTHORS: Kireyeva, N. M., Kogan, S. Ya., Kuznetsova, M. A.

TITLE: The Average Seasonal Distribution of Water Vapour Density with Altitude over USSR (Sredneseząonnoye raspredeleniye plotnosti vodyanogo para po vysote dlya territorii SSSR)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1958, Nr 5, pp 669-672 (and 2 sheets) (USSR)

ABSTRACT: The water vapour distribution is important in questions of atmospheric heat balance, average air temperature at different heights and places, and humidity (Ref.1). At present, full data are only available for Moscow (Refs.2,3), together with charts of the absolute humidity distribution for two months of the year - January and July (Ref.4) and charts of the relative humidity for each month (Ref.5). In view of this lack of information on density distribution, the authors attempted to construct a chart giving variation with height for the whole of the Soviet Union and for all seasons of the year. In order to do this, material from the Scientific Research Institute for Aeroclimatology (Nauchno issledovatel'skiy institut aeroklimatologia) on the mean seasonal values of the relative humidity and temperature, for 57 stations in the USSR, was used. The water vapour density

Card 1/5

49-58-5-12/15

The Average Seasonal Distribution of Water Vapour Density with Altitude over USSR.

was calculated from the formula (Ref.6):

$$\rho\omega = 0.29 \times 10^{-5} \frac{rE(T)}{T} \text{ gm/cm}^3 \qquad (1)$$

where r is the relative humidity as a fraction of unity, T is the temperature in degrees C and E(T) is the compressibility of water vapour in units of mm of Hg. To obtain the mean seasonal values for $\rho\omega$ in Eq.(1) the mean seasonal values of r and T are used together with the value for E(T) for a temperature $0° > T > -16°$ taken over water or ice according to the season and the situation of the station. Thus in Spring, Summer and Autumn, almost all the stations (except those in the far North) had E(T) taken over water. In the Winter, E(T) was taken over ice for all except the southernmost stations or those situated by the sea. In order to estimate the error produced by

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The Average Seasonal Distribution of Water Vapour Density with Altitude over USSR.

substituting average values of relative humidity and temperature in (1), Magnus' formula (Ref.6) for the compressibility of water vapour was used:

$$E(T) = E_o . 10^{\frac{aT}{b+T}} \quad \text{where} \quad a = 7.5,$$

$b = 237.3^o$. The error, δ, is then:

$$\delta = \frac{\rho_{w_{cp}} - \frac{1}{N}\sum_{i=1}^{N} \rho_{wi}}{\rho_{w_{cp}}} \qquad \text{where:}$$

$$\rho_{w_{cp}} = 0.29 \times 10^{-5} \frac{r_{cp}E(T_{cp})}{T_{cp}}, \quad \rho_{wi} = 0.29 \times 10^{-5} \frac{r_i E(T_i)}{T_i}.$$

N is the number of observations at a given point and in a given season; r_i and T_i are the values of the relative

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humidity and temperature for each observation; $r_{cp} = \frac{1}{N}\sum_{i=1}^{N} r_i$, $T_{cp} = \frac{1}{N}\sum_{i=1}^{N} T_i$ are the average (per season) values of the relative humidity and temperature for a given point and height. The magnitude of δ can be written in the form Eq.(2). Calculations indicate that members of the series (2) die away quickly and, to estimate δ, only the first two members need to be taken into account - giving the magnitude to about 5-7%. The values for water vapour density, ρ_W, at different heights for each season over the USSR are given in Figs.1-4. The maximum height, for which values of the water vapour density are given, varies with the season. Thus the maximum height in Autumn and Winter is 5 km, in Spring, it is 6 km and in Summer it goes up to 7 km. This variation is explained partly by the small number of observations at heights greater than 5 km and, partly, by the inaccuracy of humidity measurements at great heights. The charts give the isolines of density in winter, autumn and spring for heights from the Earth's surface up to 3 km at 0.5 gm/cm³ at from 5 km and higher at 0.1 gm/cm³. For the summer, the lines are given at the Earth's surface and a height of 1 km at 1.0 gm/cm³ intervals, for a height of 3 km at 0.5 gm/cm³, and for a height of 5 km at 0.1 gm/cm³. As a check a comparison was made with the charts in Ref.4 and 5. The result was completely satisfactory. There are 4 figures and 5 Soviet, 1 German references.

ASSOCIATION: Akademiya nauk SSSR, Institut Fiziki atmosfery (Institute of Atmospheric Physics)

SUBMITTED: May 13, 1957.

1. Humidity--USSR

66578

3.9300

SOV/49-59-9-10/25

AUTHOR: Kogan, S. Ya.

TITLE: The Determination of Energy of Bodily Seismic Waves

PERIODICAL: Izvestiya Akademii nauk, SSSR, Seriya geofizicheskaya, 1959, Nr 9, pp 1372-1374 (USSR)

ABSTRACT: This work is a reprint from the Journal "Acta Geophys. Chin." The energy of bodily waves for distances greater than 1000 km is defined by Eq (1). This equation has three characteristic factors: the first, Eq (2), describes the geometrical character of the wave propagation, the magnitude of the second, e^{kL}, depends on the wave damping, and the third

$$\int_0^{t_1} (A/T_1)^2 \, dt$$

depends on the form of waving. The analysis of these factors is illustrated by Figs 1 to 7 which show the following: Fig 1 - the results of calculation of Eq (2) for h = 0 (1 - Eq (3), 2 - from Ritzema (Ref 3), 3 - from Jeffreys (Ref 4)); Fig 2 - the relationship of the epicentric distance and the parameter Δ defined as $\Delta(\bar{p})$ by

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The Determination of Energy of Bodily Seismic Waves

Savarenskiy (Ref 1) and as $\Delta_1 (\bar{p})$ by Jeffreys (Ref 4); Fig 3 - result of calculation

$$1 - \frac{d^2T}{d\Delta^2} = \frac{v_0}{R} \frac{1}{\frac{d\Delta_1}{dp}} ; \quad 2 - \frac{\delta^2 T}{\delta \Delta^2} \quad \text{from Eq (5)}$$

Fig 4 - approximation circles of the seismic rays L_1 and L_2 at the point ABC (L_1 and L_2 calculated from formula at the foot of p 1373 and top of p 1374); Fig 5 - length of seismic rays; Fig 6 - propagation of the PcP wave for h = 0 (Eq (2)); Fig 7 - length of the seismic ray L of the PcP wave. There are 7 figures and 4 references, 2 of which are Soviet and 2 English.

ASSOCIATION: Akademiya nauk SSSR, Institut fiziki Zemli (AS USSR, Institute of Physics of the Earth)

SUBMITTED: July 7, 1958

Card 2/2

KOGAN, S.Ya.

Effect of absorption on the shape of seismic pulses. Izv. AN SSSR. Ser. geofiz. no.9:1280-1289 S '61. (MIRA 14:9)

1. Akademiya nauk SSSR, Institut fiziki Zemli.
(Seismometry)

32697
S/049/61/000/012/001/009
D216/D303

9.9465 (1109, 1327)

AUTHOR: Kogan, S. Ya.

TITLE: On determining the coefficient of absorption of seismic waves

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya geofizicheskiya, no. 12, 1961 1738 - 1748

TEXT: This paper gives a study of the change of seismic impulses due to absorption, with particular reference to the dependence of the absorption coefficient α on frequency ω

$$\alpha = k|\omega|^n. \qquad (1)$$

k and n being arbitrary. Asymptotic formulae are obtained which may be used to determine k and n. An initial impulse f(t), duration T, after travelling distance x will have the form

$$f(a,z) = \int_{-\infty}^{\infty} f(\xi)\, I_n\,(a(\xi - z))\, d\xi\,. \qquad (7)$$

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where

$$I_n\,(a(\xi - z)) = \frac{a}{2\pi}\int_{-\infty}^{\infty} e^{-|\lambda|^n + i\lambda a(\xi - z)}\,d\lambda, \qquad (6a)$$

and

$$\frac{\omega T}{2a} = \lambda, \qquad a = \frac{T}{2\sqrt[n]{kx}}; \quad \frac{2t}{T} = \xi; \quad \frac{2\tau}{T} = z. \qquad (4)$$

and $\tau = t - x/c$, c being the velocity of the impulse. From this, it is shown that for any value of n the decrease in amplitude with distance is much lower than if the decrease followed an exponential law of the same order. Considering now Eq. (7) for large distances from the initial impulse, $a \ll 1$, by expanding the frequency spectrum of the pulse f(t) about $\omega = 0$, this equation becomes

$$f(a,z) = \frac{1}{2\pi}\sum_{l=0}^{\infty}\frac{C_l}{l!}\,a^{l+1}\,\Psi_n^{(l)}\,(az). \qquad (14)$$

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where

$$C_1 = \left(\frac{2}{T}\right)^{1+1} \int_{-\infty}^{\infty} t^1 f(t)dt = \int_{-\infty}^{\infty} \xi^1 f(\xi)\, d\xi, \qquad (11)$$

and

$$\Psi_n^{(1)}(az) = (-i)^1 \int_{\infty}^{\infty} \lambda^1 e^{-|\lambda|^n - i\lambda az}\, d\lambda \qquad (13)$$

Then, for $a \ll 1$, $f(a,z)$ in Eq. (14) is determined by the first non-zero term in the summation. If this is C_0, then at large distances from the initial impulse, the pulse $f(a,z)$ will be symmetrical with maximum amplitude $A(x)$ at $z = 0$. From Eq. (14) the relation

$$A(x) = \frac{1}{\sqrt[n]{x}} \cdot \frac{1}{\sqrt[n]{k}} \frac{\Gamma\left(\frac{1}{n}\right)}{\pi n} \int_{-\infty}^{\infty} f(t)dt. \qquad (17)$$

results, where $\Gamma(1/n)$ is the gamma-function, giving a direct connection between $A(x)$ and the two parameters of the absorption law, k and n. A similar relation is obtained for the case $C_0 = 0$, $C_1 \neq 0$. For $a \gg 1$, at small initial impulse, the dimensionless variable $\mu = T\omega/2$ is introduced, and $f(a,z)$ is written as a series in $1/a^n$, e.g. for $n > 1$

$$\frac{f(a,z)}{f(t_1)} = 1 - \frac{(-1)^{n/2}}{a^n}\left(\frac{T}{2}\right)^n \frac{f^n(t_1)}{f(t_1)} + \dots \qquad (24)$$

where $t_1 = Tz_1/2 + x/c$ is the point of maximum amplitude of $f(t)$, and z_1 is the point at which the maximum amplitude of $f(a,z)$ is reached. From this, it is shown that for $n > 1$, the function $f(x, \tau_1)$, where $z_1 = 2\tau_1/T$, is determined by the nth derivative of $f(t)$ at point t_1. $f(t)$ is approximated by a Gaussian, $f_1(t) = Ae^{-\Gamma(t-t_1)^2}$, with $A = f(t_1)$ and $\gamma^2 = -f''(t_1)/2$. Then the series for $f(a,z)$ has the form

$$\frac{f(a,z_1)}{f(t_1)} = 1 - \frac{1}{a^n}\frac{1}{\sqrt{\pi}}\Gamma\left(\frac{n+1}{2}\right)\left(-\frac{T^2 f''(t_1)}{2}\right)^{n/2} + \dots \qquad (27)$$

Considering the values of x, for which the first two terms of Eq. (27) are a sufficiently close approximation, it is shown that

$$\beta_1 = \frac{1}{\sqrt{\pi}} k \Gamma\left(\frac{n+1}{2}\right)\left(\frac{2b}{T_1^2}\right)^{n/2}. \qquad (30)$$

where β_1 is the rate of change of maximum amplitude f(a,z) with distance, and $b = -f''(t_1)T_1^2$. Thus a basis is provided for determining both n and k. A comparison is made with the work of Ricker (Ref.3: The form and nature of seismic waves and the structure of seismograms. Geophys., 5, no. 4, 1940), who defined his initial impulses as either the first or second derivative of the δ-function, and obtained an equation similar to Eq. (7). The general result in the present paper only approximates to that of Ricker at sufficiently large distances from the source. The author points out that in the use of the equations derived for determining n and k, observations should be made with a wide-band apparatus, or account should be taken of distortion of the impulse in the

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On determining the ... D216/D303

receiving channel. There are 9 figures and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: N. Ricker, The form and nature of seismic waves and the structure of seismograms. Geophys. 5, no. 4, 1940.

ASSOCIATION: Akademiya nauk SSSR, Institut fiziki zemli (Academy of Sciences. USSR, Institute of Physics of the Earth

SUBMITTED: May 18, 1961

Card 6/6

seismic energy from a source on the surface presented by M. V. Zvolinskiy, editorial staff)

AN SSSR Izvestiya, ser. geofiz.

seismic energy, seismic wave, surface wave, Fourier-Bessel ... wave, source ...

The author examines a homogeneous isotropic half space at the boundary ... the pressure p(r,t) is in effect. This function is arbitrary but is ... and ... and may therefore be represented in the form of a Fourier-... integral. Formulas are obtained that describe the distribution of seismic ... They show that the energy maximum of a source departs ... the surface ... maximum in the longitudinal wave ... wave energy, as observed ... the epicenter ... and absorbing media) and the parameters of the source. The author has

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L 17422-63

ACCESSION NR: AP3005551

formulas for the dependence of seismic energy on distance in ... Orig. art. has: 5 figures and ... formulas

Akademiya nauk SSSR Institut fiziki Zemli (Institute of Physics of ... Academy of Sciences, SSSR)

...dSep62 DATE ACQ: 20Aug63 ENCL: 00

SUB CODE: PH, AS NO REF SOV: 004 OTHER: 007

KOGAN, S.Ya.

Seismic energy generated by a source located on the surface.
Biul.Sov. po seism. no.15:132-138 '63. (MIRA 17:4)

L 3171-66 EWT(1)/EWA(h) GW

ACCESSION NR: AP5017038 UR/0387/65/000/004/0009/0022 16
534.222.2 13
B

AUTHOR: Kogan, S. Ya.

TITLE: Relationship of atmospheric explosion parameters to seismic energy

SOURCE: AN SSSR. Izvestiya. Fizika zemli, no. 4, 1965, 9-22

TOPIC TAGS: seismic energy, atmospheric explosion, surface explosion, explosion parameter, direct wave, Rayleigh wave, surface wave 44,55

ABSTRACT: Analytical methods and formulas, developed to express the dependence of surface-wave energy on the parameters of atmospheric or surface explosions, show that the character of the dimensions of the affected source area and the time at which the explosion occurs depend on the dimensionless explosion parameter $\xi_0 = hp_1^{1/3}Q^{-1/3}$. The formula

$$\frac{\Delta p(r,t)}{p_1} = \frac{p_1(\xi_0) - p_2(\xi_0)}{4 \; p_1} \varphi\left(\frac{r}{L_{x\,\mathrm{reflect}}}\right) \psi\left(\frac{t - t_0(r)}{t_{x\,\mathrm{reflect}}}\right) + \frac{\Delta p_{\mathrm{direct}}(R,t)}{p_1},$$

expressing the pressure exerted on the earth's surface at the source during an

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explosion produced by a charge of size Q at altitude h, makes it possible to accurately determine the spectra of these sources for surface or atmospheric explosions. Here L_x is the characteristic length of a surface wave generated at the epicenter during a surface explosion, and t_x is its characteristic period. The frequency of the spectra of low-level or surface explosions ($\xi_0 < 0.3$) depends on the size of the charge and the velocity of the surface wave—the larger the charge, the lower the frequency of the source spectrum. Identical charges above different kinds of bedrock produce different spectra--the softer the bedrock, the lower the frequency. The frequency for the spectra of high-altitude explosions ($\xi_0 > 2$) depends on charge size and the height of the explosion, the frequency becoming lower with an increase in the altitude of the explosion. When charges of different sizes are exploded at identical altitudes, the source spectrum becomes lower in frequency as the charge size is increased. Formulas derived to express source spectra were used to determine the energy of surface waves generated by the explosions, and these, in turn, were related to the energy E_R (Δ) of Rayleigh waves observed at distances Δ from the epicenters. The formula

$$2\pi\Delta C_R^2\rho_2 A\int_0^{\infty} a_r v_z\,dt = \frac{2\pi^3\sqrt{\pi}\,Dp_1^2}{b^2\mu\rho_0}(2Q)B_1^3\frac{1}{(2a_1+\eta^2)^{1/2}}$$

was used for surface explosions. Here, C_R is the velocity of the Rayleigh wave